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ABSTRACT

This study explored stability in cognitive and motivational functioning of children from 3 months old to 3.5 years old, as well as stability in the quality of care provided by parents during this time. The purpose was to determine the locus of continuity over time--whether it is within the child or the caregiving environment. A total of 37 predominantly middle-class mother-child dyads participated in the study. Caregiving was measured at 3 months, 9 months, and at 3.5 years; child functioning was measured at 1 year and 3.5 years. Results indicated that it was possible to document modest continuity in child functioning and notable continuity in parental functioning from the first to the fourth year of life. Data on parental correlates of child functioning replicate findings that superior child functioning and optimal parental care co-occur. Data also suggest that continuity in functioning is at least in part a product of the environmental context, whether that is thought of as the immediate caregiving environment, or as the broader context of life events affecting the family. A three-page reference list and eight data tables are included. (PCB)

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CONTINUITIES AND DISCONTINUITIES IN CHILD AND PARENTAL FUNCTIONING: OBSERVATIONS AND EXPLANATIONS

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Introduction

Predicting behavior and/or performance over time is the very crux of developmental research. From the simplest conceptions of homotypic stability in functioning, to increasingly complex models of heterotypic functions that evolve in interaction with the environment and that differ in phenotype at different developmental stages, developmental theory attempts to make such prediction possible. Empirical efforts have proven moderately successful during the early years of life, despite generally poor predictability from the very first year. The power of predictive equations, however, appears to depend upon both the domain of child functioning selected and the familial context in which development occurs.

For example, research is consistent in finding cognitive competence relatively stable after the age of two, with only modest stability evident before that time. McCall (1974) and Scarr-Salapatek (1976) have argued that the reason for this is "canalization" of early intellectual development -- a species-governed unfolding of functions that is relatively impervious to (non-extreme) environmental forces. However, data such as those reported by Riksen-Walraven (1978) dispute this position by demonstrating that particular measures of very early intellectual functioning (e.g., habituation rate, preference for novelty) are meaningfully related to environmental differences and systematically correlated with later cognitive competence.

Stability in motivational functioning has received some, but not as much, attention as stability in intellectual functioning (Yarrow, McQuiston, MacTurk, McCarthy, Klein, & Vietze, 1983). In most studies, the two are jointly examined and their interrelations explored (e.g., White, 1975). In general, one finds some stability in behavioral indices of motivation, as well as linkages within and across time with cognitive competence (Hrncir, 1984, 1985). Relations tend to be specific and scattered, however, especially across timespans of more than one year (Jennings, Yarrow, & Martin, 1984).

Relevant to these predictive efforts is a considerable amount of data linking both stimulation and responsivity in the home to concurrent and subsequent cognitive-motivational functioning in infants and young children. For any given domain of child functioning, specific categories of parental behavior seem especially relevant. In the cognitive arena, whether the emphasis is on performance or motivation, three aspects of caregiving prove consistently superior in the prediction of very early child functioning. These are: (1) the amount of social and inanimate stimulation routinely provided (Bradley & Caldwell, 1976; Bradley, Caldwell, & Elardo, 1979; Carew, 1980; Clarke-Stewart, 1973; Gottfried & Gottfried, 1984; Olson, Bates, & Bayles, 1984; Power & Chapieski, 1984; White, 1975; Yarrow, 1976; Yarrow, Rubenstein, & Pederson, 1975), (2) the variety of that stimulation (Clarke-Stewart, 1973; Elardo, Bradley, & Caldwell, 1975; Yarrow, Klein, Lomonaco, & Morgan, 1975; Yarrow, Rubenstein, & Pederson, 1975), and (3) the responsiveness of the environment to the child's behavior (Endsley, Garner, Odom, & Martin, 1975; Finkelstein & Ramey, 1977; Frodi, Bridges, & Grolnick, 1985; Lewis & Goldberg, 1969; Ramey & Finkelstein, 1978; Wachs, 1978; Watson & Ramey, 1972, Yarrow, 1976).

Thus, one line of evidence suggests that cognitive-motivational functioning can demonstrate some stability across early childhood, and a second line of evidence indicates that this early functioning is affected by environmental experiences. Taken together, the evidence challenges the developmentalist to consider the role parental functioning plays in the

devlopmental continuity issue. At the very least, one would expect to find that caregiving is also stable over time, that the context for consistent cognitive-motivational differences is itself relatively unchanging. At the other extreme, a stable caregiving environment may be responsible for whatever stability exists vis-a-vis early child functioning.

In general, there is empirical consensus that parents who are stimulating of and responsive to their infants will continue to be so later on during toddlerhood and into the preschool period (Bradley, 1985; Bradley & Caldwell, 1982, 1984; Hanson, 1975; Olson, Bates, & Bayles, 1984; Riksen-Walraven, 1978; Wachs, 1978; Yarrow, Klein, et al., 1975). But to what extent are continuity in childcare and continuity in child functioning linked? Or, conversely, to what extent are discontinuity in childcare and child functioning linked? More and more investigators are exploring the circumstances under which developmental discontinuity occurs, and finding that changes in parental functioning and/or conditions that influence parental functioning often presage shifts in children's developmental status (Erickson, Sroufe, & Egeland, 1985; Ricks, 1985). Individuals change, circumstances change, and either or both may be the source of ultimately predictable discontinuity in cognitive-motivational functioning.

It is noteworthy in Bradley and Caldwell's (1982; Bradley, 1985) work that among more socioeconomically and ethnically disparate families, it was more difficult to discern systematic relations either in parental or child functioning over time or between the quality of environmental support and subsequent child functioning. This concomitant absence of patterns (i.e., little developmental prediction in the face of environmental instability) provides indirect support for the notion that continuity in child development may depend, in part, upon consistency in the rearing environment. If an eventual applied goal is to understand how cognitive competence and mastery motivation are maximized during middle and later childhood, developmentalists must first establish the locus of continuity and change. Whether this rests within the individual child or in the environmental context in which that child develops has implications for developmental theory as well as for applied interventions.

The study described here explored stability in early child functioning and in the quality of care provided from the third month through the fourth year of life. Data from some 62 middle-class families on maternal care at 3 and 9 months, and infant cognitive and exploratory competence at 12-15 months, were analyzed in conjunction with comparable data on parental care and child functioning from a subset of 37 mothers and children who were followed up at 3 1/2 years of age. At issue in this investigation is the locus of continuity over time -- whether it is primarily within the child him or herself, or within the caregiving environment. It is with the goal of addressing this question that the following data are presented.

Methods

Sample

Thirty-three of 57 predominantly middle-class mother-child dyads who had participated in all phases of an earlier investigation of infant and family development over the first year of life were available and willing to participate in a longitudinal follow-up study in the fourth year. Four additional mother-child pairs for whom some portion of their previous data were missing were also willing to partipate in the follow-up study. Ten families had moved from the area and 14 refused further involvement in the project.

Approximately half the children participating in the follow-up study were male (males = 17; females = 20) and slightly over half were firstborns (firstborns = 22; laterborns = 15). Three of the children were living with their mothers only at the time of the follow-up visit as a result of parental separation or divorce. The remaining children all lived in two-parent households.

Procedure

Families began initial study participation during the last trimester of pregnancy with an interview that was repeated at three and nine months postpartum. Home observations of parent-infant interaction took place at three and nine months, and within the first three months of the second year, infant development was assessed. During the 3 1/2-year home visits, staff re-evaluated child functioning, observed the home environment, and interviewed mothers about aspects of the current care provided their child. For the purposes of this investigation, analyses were limited to measures of three-month, nine-month, and 3 1/2-year caregiving, and 1- and 3 1/2-year child functioning.

Measures

Three- and Nine-month Home Observations

In order to observe mother-infant interaction, each mother-infant dyad was scheduled to be visited at home within one week of the infant's three- and nine-month birthdates, at a time when the baby was expected to be awake and father not at home. Mothers were encouraged to go about their everyday household routine during the 45-minute home observations. Emphasis was placed upon the observers' interest in infant behavior in order to decrease the possibility that mothers would alter their routine involvement with the baby. Observational data were recorded using a behavior checklist employed on a continuous time-sampling basis. Every time a precoded behavior occurred within a given 15-second sampling interval, that behavior was checked off. Across 45 minutes of observation, then, behavior scores could range from 0 to 180.

All observers were trained intensively over a period lasting no less than two months -- first using videotapes, then during live home observations. During the course of the study, 42 formal reliability checks were conducted during in-home observations. Intercorrelation of total frequency scores for each of the discrete behaviors coded ranged from 0.63 to 0.99, with a mean in excess of 0.85.

Four individual codes were standardized and summed to create measures of maternal stimulation and responsivity. The measure of maternal stimulation consisted of two behavioral codes: (1) vocalization -- mother speaks to infant or for infant, makes animal sounds, sings to infant, or changes intonation, and (2) stimulation -- mother presents stimuli to infant, touches infant with finger, plays with infant, or makes other attempts to arouse infant by bouncing, moving, stressing muscles, etc. Stimulation and vocalizations were substantially correlated ($r = 0.65$, $p < .01$).

The measure of maternal responsivity consisted of a behavioral code of maternal vocal responsiveness and a behavioral rating of maternal sensitivity during interaction with her baby. A maternal response was coded whenever mothers vocalized in response to or in imitation of their infant's non-fussy vocalizations. Immediately after the mother-infant observation, observers rated mothers' interaction with their infants on a nine-point sensitivity scale. Judgments were based on four aspects of maternal behavior: (1) mother's awareness of her infant's behavioral cues and signals, (2) mother's accurate interpretation of these signals, (3)

the appropriateness of her responses to them, and (4) the promptness of her responses. The correlation between sensitivity ratings and vocal responsiveness was modest but significant ($r = 0.31$, $p < .05$).

One-Year Infant Assessments

Infants were scheduled to be seen with their mothers and with their fathers, each for one hour, at the University infant laboratory when infants were one year of age. The order of these (separate) visits with each parent was counterbalanced. Half the children were seen at 12 months with mother, half at this time with father. The second parent accompanied his or her child for a 13-month lab visit. For the first 30 minutes of each visit, an examiner conducted an assessment of free and elicited play.

Exploratory behavior. Using the procedure developed by Belsky and Most (1981), each infant was provided with two sets of toys to play with for up to 10 minutes apiece in the company of parent and examiner. After a brief warm-up period, the play examiner conversed with the parent while, simultaneously, a play narrator, working behind a one-way mirror, described the child's play acts into a tape recorder.

At the completion of these two free play sessions, the play narrator made an evaluation of the child's most cognitively sophisticated play acts using a slightly modified version of the Belsky and Most play scale. This modified play scale appears in Table 1. Reliability in the assessment of the highest level of free play was tested by comparing the evaluations of the play examiner and play narrator. Observers agreed about the child's highest level of free play at a rate exceeding 90%.

Motivational expression. In order to assess infant motivational expression, play acts observed throughout the free play period were compared against the highest level of play infants demonstrated during an elicitation procedure. Motivation was therefore conceptualized in terms of an infant's persistent deployment of his or her most sophisticated level of exploration. The notion that an infant's highest level of elicited play could be considered a measure of competence, or the highest level of skill of which that infant is capable, receives support from research on imitation. Results of a variety of studies indicate that children do not blindly mimic a model, but demonstrate only those aspects of behavior that they understand and can assimilate (Harnick, 1978; McCall, Parke, & Kavanaugh, 1977; Scallon, 1976; Uzgiris, 1984). The comparison between free and elicited play employed as the index of motivational expression was operationalized as a measure termed "executive functioning." This index represents the sum of all observed manipulative (lower-level) and pretend (upper-level) play acts, weighted according to their discrepancy from the level of competence attained during elicited play. Reliability in executive functioning was demonstrated by the substantial correlation between scores obtained at the 12- and 13-month visits ($r(50) = 0.58$, $p < .01$).

Cognitive competence. Within the first three months of the second year, infants were tested on the Bayley Scales of Infant Development. Evaluations were conducted at home by a trained examiner.

3 1/2-year Follow-up Assessments

At 3 1/2 years of age, two Project staffpersons visited each family's home for the purposes of re-evaluating the child's level of cognitive functioning and motivational expression and the quality of care provided in the home. While one staffperson interviewed the mother about the home environment, the second assessed child exploratory motivation. Following this period of data collection, the two staffpersons exchanged roles. The mother interviewer then tested the child's intelligence while the child

observer obtained information from the mother on previous and current life events.

Assessment of the home environment. In order to assess the degree to which parents provided their children with age-appropriate stimulation, as well as responsive care, Caldwell and Bradley's (1979) Home Observation for Measurement of the Environment (HOME) Inventory was used as a rating instrument. The 55-item HOME Inventory for preschoolers consists of eight subscales assessing the quality of physical, cognitive, and socioemotional care provided the child in the home. Following the example set by Bradley (1985) in his consortium study, 3 1/2-year HOME subscales were differentiated on the basis of their assessment of a stimulating as opposed to a responsive caregiving environment. Responsivity was indexed through the Pride, Affection, and Warmth subscale, which captures parental responsivity to both the emotional needs and individual qualities of their child. Two stimulation scales -- Language Stimulation and Stimulation of Academic Behavior ($r = 0.48$, $p < .01$) -- jointly served as the index of stimulating care provided by parents. Scores on these latter two subscales were standardized and summed to create a single score for stimulation.

The Life Events Questionnaire was administered subsequently in order to provide information relevant to the question of environmental consistency from the first to the third year. The purpose of this assessment instrument was to chronicle experiences that families may have had over the 2 1/2-year timespan between Project contact points that might have created stress for parents and children. It was expected that stressful changes in family circumstances might have an impact on the quality of caregiving parents are able to provide their children, as well as on the cognitive-motivational functioning of the children themselves. Since stressful experiences may have an impact on children in two ways--either directly, or indirectly through the quality of care received--the Life Events Questionnaire was designed to distinguish mothers' perceptions of the effects of individual events on themselves and on their children. Every effort was made to include events that are both major (e.g., a move, a death) and relatively minor (e.g., father's five-day business trip) on the assumption that events of both types can generate stress. Because scores on life event stress for mother and child were correlated ($r(37) = 0.46$, $p < .001$ for current stress; $r(37) = 0.63$, $p < .001$ for previous stress), the two were summed to create a single index of perceived life event stress.

Exploratory behavior and motivational expression. As an index of children's exploratory motivation, observations were made of children's spontaneous exploration of the Banta Curiosity Box. The Curiosity Box, originally constructed by Banta (1970), is a rectangular wooden box ornamented with manipulative devices and tactile elements, and containing several interior chambers holding various attractive objects that can be glimpsed through two hinged doors and panes of plexiglass. Each child was permitted to engage this curiosity-provoking stimulus for up to 10 minutes. Working with a stopwatch, checklist, and rating scales, the observer evaluated what the child did with the box and his or her affect during exploration. Three summary scores, derived by standardizing and summing specific qualitative and quantitative measures, were created on the basis of correlational patterns and conceptual convergence. The first of the summary scores, consisting of ratings on Self-Esteem, Affect, and Agency scales and the number of questions children asked during exploration, was given the label "agency." The second, consisting of the

total number of manipulations observed, the number of sides of the Box explored, and ratings on a Level of Play scale, was labelled "information-gathering." The final summary score, consisting of children's total play time (out of 10 possible minutes) and ratings on an Involvement scale, was termed "involvement."

Cognitive competence. For the purposes of attaining a reliable and valid assessment of intellectual competence among the young children of the sample, the McCarthy Scales of Children's Abilities were administered by a trained examiner. The global General Cognitive Index (GCI) was used in all analyses.

Results

Findings regarding continuity and discontinuity in child and in parental functioning are presented separately. Following this, results bearing on the interrelations between child and parental functioning are reported. On the basis of sample and effect size considerations, the alpha-level for tests of statistical significance was set at 10%. Because the sample size was small to begin with and because some sex differences are indicated in the literature, a 5% probability level was deemed too stringent for this investigation, given the size of effects anticipated in several of the analyses. The relative increase in statistical power was believed to offset the somewhat greater risk of a Type I error.

Selective Attrition

Two MANOVAs conducted on relevant demographic variables obtained from families at the time of initial enrollment in the study, and two MANOVAs conducted on parental care at nine months and infant functioning at one year, revealed no systematic differences between families that did and did not remain in the study for the 3 1/2-year follow-up investigation. Thus, families participating in the follow-up did not differ significantly from those that dropped out of the Project on characteristics or behaviors relevant to this investigation.

Child Cognitive and Motivational Functioning

Significant mean-level differences due to child gender or birthorder were not found on any of the measures of child functioning obtained either at 1 or 3 1/2 years. In the absence of level differences, data were combined for all subsequent analyses, except in those cases where differential patterns were observed for boys and girls.

Continuity in Child Functioning

Prediction of exploratory motivation at 3 1/2 years from one-year infant behavior was possible for boys only. Among boys, the play-based measure of motivation, termed "executive functioning" predicted later Agency scores during exploration of the Curiosity Box ($r(14) = -0.68$, $p < .01$). Infant boys who played at or near their level of competence at one year later appeared more confident, self-assured, and efficacious as 3 1/2 year olds during Box exploration. Similarly, Bayley MDI at one year predicted boys' but not girls' Agency score during exploration of the Curiosity Box ($r(14) = 0.67$, $p < .01$). In each case, the sex difference in prediction of later Agency was significant by Fisher's Z Transformation ($z = 8.15$, $p < .01$ for executive functioning; $z = 5.31$, $p < .05$ for Bayley MDI). Although the sex difference was not reliable, boys' but not girls' Curiosity Box Information-gathering scores were also significantly predicted from Bayley MDI ($r(14) = 0.54$, $p < .05$). Boys who performed well on the Bayley at one year were more active in manipulating and more sophisticated in exploring the Curiosity Box.

Continuity was observed for all children in cognitive performance on standardized developmental scales. Regardless of gender, one-year Bayley

MDI predicted performance on the McCarthy Scales at 3 1/2 years ($r(30) = 0.36$, $p < .10$).

Discontinuity in Child Functioning

Whether the focus is motivational expression or cognitive competence, the gender differences and/or modest correlations suggest that only limited relations exist between infant data collected at one year and data on child functioning at 3 1/2 years. It is possible, though, that disruptions in the family impinging directly or indirectly on the child contributed to the relative instability in child status from the first to the fourth year. This hypothesis was assessed by conducting a set of hierarchical regression analyses that tested for the independent and interactive effects of infant status and perceived impact of life events on 3 1/2-year child motivation and comptence. In every case, order of variable entry was: (1) infant status, (2) life event stress, and (3) infant status X life event stress.

In the case of 3 1/2-year McCarthy performance (GCI), there was a significant effect of reported life events ($F(1,29) = 3.73$, $p < .10$) that contributed to the predictive equation after Bayley MDI ($F(1,29) = 4.72$, $p < .05$) was entered. Children whose mothers reported greater hardship as a result of intervening life events tended to perform slightly <u>better</u> on the McCarthy Scales at 3 1/2 years. The model accounts for 29% of the variance in McCarthy performance. Table 2 illustrates these relations.

In one other statistical model information on life event stress proved a significant entry. For boys, the reported effects of life events helped to account for instability in motivational scores from 1 to 3 1/2 years. In this case, the impact of life events interacted reliably with infant motivational status in predicting later motivational outcomes ($F(1,13) = 8.52$, $p < .05$). Infant boys who appeared less motivated in play at one year <u>and</u> whose mothers reported negative intervening life experiences obtained the lowest ratings on Agency in Curiosity Box exploration at 3 1/2 years. Those who appeared higher in motivation at one year, whose mothers reported less stressful intervening experiences, scored especially high on 3 1/2-year Agency. Table 3 presents these relations. This model, based only on one-year executive functioning and reported life event stress, accounts for 72% of the variance in later motivational scores during play.

Life event scores were not a significant variable in the third regression model tested. That is, neither the independent nor interactive effects of reported life events contributed significantly to prediction of Curiosity Box Agency from Bayley scores for boys.

Parental Functioning

Mean differences in stimulation and responsivity provided to children of each gender and birthorder were assessed by MANOVAs conducted at each observation point (three and nine months and 3 1/2 years) before any substantive analyses were undertaken. Significant sex differences were found only at nine months in the amount of stimulating and responsive care provided ($F(2,63) = 3.40$, $p < .05$). Follow-up univariate ANOVAs indicated that mothers were substantially more stimulating ($F(1,64) = 6.31$, $p < .05$) and somewhat more responsive ($F(1,64) = 3.86$, $p < .10$) with infant girls. At each age, however, means favored the parents of girls.

With respect to birthorder, analyses revealed that firstborns experienced more involved care--as it was assessed in this investigation--at all ages ($F(2,68) = 6.04$, $p < .01$ at three months; $F(2,63) = 9.78$, $p < .001$ at nine months; $F(2,34) = 11.58$, $p < .001$ at 3 1/2 years). Follow-up univariate ANOVAs established that these differences were reliable both

for stimulation and responsivity. Means and standard deviations on all parental care measures appear in Table 4.

Continuity in Parental Functioning

Correlations between early and later care were comparable for parents of boys and girls, and firstborns and laterborns, so data were combined across subsamples for analyses on the consistency of care. Behavioral measures of maternal stimulation and responsivity were substantially correlated at three ($r(71) = 0.55$, $p < .001$) and nine months ($r(66) = 0.55$, $p < .001$). The HOME scale measures of stimulation and responsivity at 3 1/2 years were also related ($r(37) = 0.30$, $p < .10$), and were significantly predicted by the earlier behavioral indices. These relations are presented in Table 5.

Two regression equations were computed for prediction of parental care at 3 1/2 years from observations of care during the first year. Since child birthorder and maternal level of education and occupational status (standardized and summed to create a single maternal SES score) each had some bearing on the level of care provided, both were entered into the equations prior to three- and nine-month care. The amount of stimulating care provided at 3 1/2 years was reliably predicted by earlier care, even after controlling for child birthorder and maternal SES. Three-month care made some contribution to the predictive equation once child and maternal status were entered ($F(1,25) = 3.00$, $p < .10$), and nine-month care significantly added to the equation over and above three-month care ($F(1,25) = 4.37$, $p < .05$). The model accounted for 56% of the variance in 3 1/2-year stimulation. Responsivity of care at 3 1/2 years was significantly predicted by maternal responsiveness at three months ($F(1,24) = 6.94$, $p < .05$). However, nine-month responsivity added no unique predictive variance once three-month responsivity had been entered ($F(1,24) = 0.02$, N.S.). This model accounted for 32% of the variance in later responsivity. These regression models are diagrammed in Table 6.

Discontinuity in Parental Functioning

In order to examine the contribution of intervening life events to the consistency of parental care observed across time, early care, life event stress, and the interaction of the two were entered in three hierarchical regression equations as predictors of later care. In each case, maternal SES was entered first as a control. Due to the restricted sample size, separate regressions were conducted for three- and nine-month stimulation and responsivity.

Results indicated that perceived life event stress did not contribute significantly in the prediction of stimulation at 3 1/2 years from earlier measures of stimulation. Neither did it contribute to prediction of later responsivity from three-month maternal responsivity scores. However, there was a significant interaction between nine-month responsivity and life event stress in the prediction of responsivity at 3 1/2 years ($F(1,26) = 3.41$, $p < .10$). Less responsive mothers (at nine months) who reported later hardship resulting from life events helped create home environments that were noticeably lower in responsive, affectionate care at 3 1/2 years. The opposite was true of mothers who behaved responsively to their nine-month infants and who perceived generally positive outcomes from changes impinging on the family. Results are summarized in Table 7. This statistical model accounts for 30% of the variance in later responsivity observed in the home at 3 1/2 years. Thus for responsivity, but not stimulation, intervening life events appeared to play a small, mediating role in the consistency observed across time.

Parental Correlates of Child Functioning

Within each observation period, information on parental care was correlated with concurrent and/or subsequent infant or child functioning. Associations involving three- and nine-month maternal care and one-year infant functioning are presented first, followed by results involving 3 1/2-year care and child functioning, and concluding with the relative contribution of early versus later care to 3 1/2-year child motivation and competence.

One-Year Relations

Significant associations between three-month care and one-year child functioning were observed only with data from boys. Stimulating care at three months was associated with superior performance on the Bayley Scales ($r(27) = 0.49$, $p < .01$) and with a smaller discrepancy between maximal and typical play levels--that is, greater motivational expression--for boys only ($r(26) = -0.49$, $p < .05$). Responsive care did not predict one-year functioning for boys, and neither measure predicted one-year functioning for girls.

No correlations between nine-month maternal care and one-year infant motivation or competence reached significance. Correlations are comparable for sons and daughters and firstborns and laterborns.

3 1/2-Year Relations

Just as nine-month maternal care failed to correlate with one-year child functioning, no significant relations were found between care at nine months and child motivation and competence at 3 1/2 years, either for the sample as a whole or for children of each gender.

In contrast, care at three months did predict some aspects of child functioning at 3 1/2 years. Correlations were comparable for boys and girls. More stimulating mothers at three months had preschoolers who later exhibited greater agency ($r(32) = 0.33$, $p < .10$) and more active information-gathering ($r(32) = 0.39$, $p < .05$) during exploration of the Curiosity Box. Active efforts to gather information during exploration were also predicted by the level of responsivity observed in mothers at three months ($r(32) = 0.34$, $p < .10$).

Four modest associations appeared between parental care and child functioning at 3 1/2 years. These are presented in Table 8. HOME stimulation scores correlated positively with scores for Curiosity Box Information-Gathering ($r(35) = 0.39$, $p < .05$) and with performance on the McCarthy Scales ($r(35) = 0.35$, $p < .05$). Scores from the HOME Inventory for responsivity were similarly related to McCarthy GCI ($r(35) = 0.32$, $p < .10$), but demonstrated a weak inverse relationship with Agency ratings during exploration of the Curiosity Box ($r(35) = -0.30$, $p < .10$). Hence, parents who scored high on stimulation tended to have children who were highly active in their exploration of the Curiosity Box and who demonstrated superior performance on standardized developmental scales. Although parents who scored high for warm, responsive care also tended to have children who performed well on the McCarthy Scales, their children tended to exhibit somewhat less confidence, pleasure, thoroughness, and verbal curiosity during Box exploration. Correlations are not substantially different for children of each gender and birth order. In addition, controlling for birth order and maternal SES does not alter the pattern of reported associations.

Early Versus Later Care

In three instances, child functioning at 3 1/2 years was predicted both by care at 3 1/2 years as well as by care observed at three months. As the final step in analyzing parental correlates of child functioning, a

series of multiple regressions was conducted to determine the relative contribution to 3 1/2-year child functioning of earlier versus concurrent care.

In the case of 3 1/2-year Information-Gathering scores for the Curiosity Box, there was no substantial contribution of 3 1/2-year care--either stimulation or responsivity--once stimulation at three months was controlled. Later care did not provide unique information vis-a-vis this measure of motivation over and above what was gained from observations of earlier care. On the other hand, both three-month stimulation and responsivity at 3 1/2 years made unique contributions to the prediction of Curiosity Box Agency at 3 1/2 years ($F(1,29) = 3.93$, $p < .10$ for three-month stimulation; $F(1,29) = 3.79$, $p < .10$ for 3 1/2-year responsivity).

Discussion and Conclusions

Results indicate that it is possible to document modest continuity in child functioning and notable continuity in parental functioning from the first to the fourth year of life. Continuity was observed both within specific domains of functioning (children's testing versus play performance, parents' responsive versus stimulating care) and across different measures of functioning (behavior counts versus ratings, direct observation versus maternal report). The very modest prediction from first year to fourth year child test scores replicates the work summarized in McCall (1974) on individual differences in early intellectual functioning. Although more provocative in their patterns within and across time, the gender differences in motivational expression have received attention elsewhere (Vondra, 1987) and will not be discussed here.

With regard to parental care, the high degree of consistency observed in this study may be a direct consequence of using relatively "age-appropriate" measures of care at each observation point. During the first year, infants' experiences are still very much a product of direct interaction with mother or father. By 3 1/2 years, they are perhaps equally determined by interaction with parents and by independent exploration and experience of the home environment that parents have established. Thus there may be a high level of functional equivalence between direct care in infancy and a broader assessment of home experiences in the preschool period.

Of particular relevance to this investigation was the role of perceived life event stress as a mediator for the relations in both child and parental functioning observed over time. Generally, life event stress appeared to undermine later competence among children and parents already functioning below the group mean (boys' motivation, parental responsivity). In other words, those already less efficacious in their behavior--very likely for reasons already embedded in the familial and environmental context (see Belsky & Vondra, 1985; Elder, Liker, & Cross, 1979; Engfer & Schneewind, 1982; Goldberg & Easterbrooks, 1984)--seem most vulnerable to the detrimental effects of further life stress. Among mothers who are more sensitive to the needs and signals of their infants, less stress translates into even greater responsivity to preschoolers. For mothers already looking less sensitive at nine months, negative events appear to undermine further their ability to respond with sensitivity to their children.

No such effects were observed for parental stimulation, leading one to suspect that differences in stimulation are more a product of social class, personal style, and knowledge about child development than they are

a product of more or less transient situational factors. It seems reasonable to suppose that family circumstances have a more immediate impact on responsiveness of care, if one assumes that sensitive awareness of and responsivity to children's needs depend on parents' ability to "decenter," to make their own problems and needs subordinate to the needs of their children (Belsky & Vondra, 1985). Presumably, when life stresses accumulate, self-absorption intensifies. Certainly data on maternal stress and depression support this interpretation (Colletta, 1983; Colletta & Gregg, 1981; Weissman, Paykel, & Klerman, 1972).

But in light of zero-order correlations linking more responsive care at both nine months ($r(31) = 0.43$, $p < .05$) and 3 1/2 years ($r(37) = 0.40$, $p < .05$) with lower reported life event stress, it is also important to entertain the possibility that among better functioning families, mothers have the resources to encounter, experience, and/or perceive events in a more constructive, less stressful light.

As in the case of parental responsivity, expression of mastery motivation among boys was enhanced by relatively little life event stress when initial motivation was already high, but was further undermined when stressful changes combined with already lower levels of motivation. With respect to motivational functioning, it seems that one can speak quite simply about beneficial or detrimental life changes for boys.

In terms of cognitive competence, the storyline appears less straightforward. What is it about perceived hardship stemming from life changes in these middle-class families that could account for higher I.Q. scores by 3 1/2 years? Presumably it is not due to any compensatory effort on the part of parents in terms of cognitively-enriching care--this kind of care, if anything, appears jeopardized by stressful events. It is not because more competent infants have mothers who are more likely to report stressful events--earlier Bayley performance is unrelated to reported event stress. The explanation apparently lies outside the set of factors examined in this study. Further research into this question should consider such alternative exlanations as, for example, the potential role of cognitively stimulating challenges for children already receiving supportive care (e.g., a new home, new substitute care, the start of preschool, new maturity or independence demands by parents) that might be the direct or indirect consequence of stressful events.

Moving on to parental correlates of child functioning, the data at three months and 3 1/2 years generally replicated findings that superior child functioning and more competent or "optimal" parental care co-occur, even within the constraints on variability posed by a middle-class sample. Furthermore, in those cases where both earlier and later care predicted later child functioning, the information gathered at each timepoint was not necessarily redundant with respect to child functioning "outcomes." In conjunction with the results regarding the predictive impact of life events, these data suggest that continuity in functioning is at least in part a product of the environmental context, whether that is conceptualized in terms of the immediate caregiving environment or the broader context of positive and negative life events impinging on the family. Gender differences and sample size limitations precluded further investigation into direct links between parental care, life events, and continuity in child functioning. Nevertheless, patterns indicated by the data are provocative enough to warrant more attention from developmentalists to factors within the child, within the family, and within the broader social setting in which each are embedded, that may determine the degree to which we find stability of functioning over time.

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Table 1

Belsky and Most (1981) Developmental Scale of Infant Play

Play Levels	Descriptions	Examples
1. Mouthing	Indiscriminate mouthing of materials	Mouthing a block or plastic donut
2. Simple Manipulation	Visually guided manipulation lasting 5 seconds	Turning over an object to examine the bottom
3. Functional	Visually guided manipulation that extracts unique information	Rolling a cart on wheels; Dialing a toy telephone
4. Juxtapose**	Juxtaposing two or more objects in a random manner	Touching a shell to a ring; Hitting a phone with a peg
5. Functional Relational	Integrating two objects in an "appropriate" manner	Placing a spoon in a bowl; Placing a peg in a pegboard
6. Enactive Naming**	Approximating pretend play	Touching a brush to one's head without making stroking motions
7. Pretend Self	Pretend play directed toward oneself	Bringing a toy phone receiver to one's head and vocalizing into it
8. Pretend External	Pretend play directed toward other	Feeding a doll with a spoon; Rolling a car with motor noises
9. Substitution Self	Giving a "meaningless" object meaning in the context of a "pretend self"	Bringing a peg to one's ear and vocalizing into it; Feeding a doll with a stick (as spoon)
10. Substitution External**	Giving a "meaningless" object meaning in the context of a "pretend external"	Feeding a doll with a stick; Pushing a block along the floor with motor noises
11. Sequence No Story	Repeating a single pretend act with a minor variation	Feeding self with spoon and feeding doll with spoon
12. Sequence Story	Linking two different pretend acts	Dialing a toy phone and talking into receiver

13.	Sequence Substitution	Incorporating a substitution into a "sequence story"	Dialing a toy phone and talking into a peg
14.	Double Substitution	Incorporating two substitutions into a "sequence story"	Stirring in a shell and feeding a doll with peg

**Play levels not modelled during the elicitation procedure

Table 2

Mean 3 1/2-Year McCarthy Performance (GCI)
as a Function of One-Year Bayley Performance (MDI)
and Intervening Life Event Stress

One-Year Bayley Performance	Perceived Life Event Stress	
	Above the Median	Below the Median
Above the Median	117.14	116.71
Below the Median	116.89	115.00

Table 3

Mean 3 1/2-Year Curiosity Box Agency Scores for Boys
as a Function of One-Year Exploratory Motivation
and Intervening Life Event Stress

One-Year Exploratory Motivation	Perceived Life Event Stress	
	Above the Median	Below the Median
Above the Median	0.40	3.42
Below the Median	-1.42	-0.83

Table 4

Mean Scores for Parental Stimulation and Responsivity at Each of Three Ages by Child Gender and Birth Order

(Standard deviations in parentheses)

	Age of Child	Girls	n	Boys	n	F	p
Stimulation	3 Months	0.17 (1.8)	32	-0.14 (1.8)	39	0.53	N.S.
	9 Months	0.57 (2.1)	30	-0.52 (1.4)	36	6.31	.05
	3 1/2 Years	0.42 (1.3)	20	-0.50 (2.0)	17	2.75	N.S.
Responsivity	3 Months	0.14 (1.5)	32	-0.11 (1.7)	39	0.42	N.S.
	9 Months	0.38 (1.1)	30	-0.38 (1.8)	36	3.86	.10
	3 1/2 Years	0.15 (0.9)	20	-0.18 (1.1)	17	1.03	N.S.
		Firstborns	n	Laterborns	n	F	p
Stimulation	3 Months	0.49 (1.9)	44	-0.79 (1.3)	27	9.19	.01
	9 Months	0.69 (1.8)	36	-0.89 (1.4)	30	15.13	.001
	3 1/2 Years	0.90 (0.9)	21	-1.18 (1.9)	16	20.41	.001
Responsivity	3 Months	0.44 (1.7)	44	-0.71 (1.3)	27	9.02	.01
	9 Months	0.57 (1.6)	36	-0.76 (1.3)	30	13.62	.001
	3 1/2 Years	0.31 (1.0)	21	-0.41 (0.9)	16	5.30	.05

Table 5

Zero-Order Correlations Between
Early and Later Parental Care

	Behavioral Measures of Care during the First Year		Observation and Interview Measures (HOME Scale) of Care at 3 1/2 Years	
	Nine-Month Stimulation	Nine-Month Responsivity	Stimulation	Responsivity
Three-Month Stimulation	0.42*** (n=63)		0.48** (n=34)	
Three-Month Responsivity		0.43*** (n=62)		0.40* (n=34)
Nine-Month Stimulation			0.63** (n=32)	
Nine-Month Responsivity				0.38* (n=31)

Table 6

Regression Models for the Prediction of
3 1/2-Year Parental Care

Correlate	3 1/2-Year Stimulation	F(1,25)	p
1. Child birthorder	r = 0.62	22.04	.001
2. 1 + Maternal SES	R = 0.66	2.72	N.S.
3. 1 + 2 + Three-month stimulation	R = 0.70	3.00	.10
4. 1 + 2 + 3 + Nine-month stimulation	R = 0.75	4.37	.05

Correlate	3 1/2-Year Responsivity	F(1,24)	p
1. Child birthorder	r = 0.34	4.04	.10
2. 1 + Maternal SES	R = 0.35	0.17	N.S.
3. 1 + 2 + Three-month responsivity	R = 0.56	6.94	.05
4. 1 + 2 + 3 + Nine-month responsivity	R = 0.56	0.02	N.S.

Table 7

Mean 3 1/2-Year Parental Responsivity
as a Function of Nine-Month Responsivity
and Intervening Life Event Stress

Nine-Month Maternal Responsivity	Perceived Life Event Stress	
	Above the Median	Below the Median
Above the Median	0.22	0.40
Below the Median	-0.78	0.31

Table 8

Correlations Between Parental Care and Child Functioning at 3 1/2 Years

	McCarthy GCI	Curiosity Box Agency	Curiosity Box Information Gathering	Curiosity Box Involvement
3-Month Stimulation (n = 32)	N.S.	0.33#	0.39*	N.S.
3-Month Responsivity (n = 32)	N.S.	N.S.	0.34#	N.S.
3 1/2-Year HOME Stim. (n = 35)	0.35*	N.S.	0.39*	N.S.
3 1/2-Year HOME Resp. (n = 35)	0.32#	-0.30#	N.S.	N.S.

# $p < .10$

* $p < .05$